

TRANSLATION INTO ENGLISH OF:

European Patent Application 0 088 914



Abstract

A Method and an Apparatus for Monitoring the Production Quality of Glass Containers

The containers (2) coming from a glass machine (1) and provided with a code are transported to a code reader (10) communicating with a process computer (15) for storing the identity of each container in the sequence in which said containers are supplied. Subsequently, container groups (2') are formed with the aid of a stopping device (13), said container groups being supplied to inspection machines (11, 12) by means of which defective containers can be sorted out. The information provided by said inspection machines (11, 12) is evaluated in the process computer (15) in the sequence of the identified containers (2) of a group (2') so as to find out an error trend. This permits a defective mould to be unequivocally identified and, if desired, replaced as early as possible so that constant quality control with regard to the individual moulds of the glass machine (1) is carried out and production losses can therefore be reduced to a minimum.

A Method and an Apparatus for Monitoring the Production Quality of Glass Containers

The present invention relates to a method and an apparatus for monitoring the production quality of glass containers which, coming from a glass machine, pass through an annealing lehr and which are provided with a mechanically readable code related to the respective mould of the glass machine.

A glass machine provided with up to ten independent stations, each comprising 1 to 4 moulds, produces containers which, immediately after solidification, pass through an annealing lehr for a period of approx. 1 hour so as to stress-relieve the material. Exact quality control is only possible when the containers have left the annealing lehr, said quality control being nowadays carried out by automatic inspection units to an increasing extent. These automatic inspection units examine the containers e.g. with regard to cracks, dimensional deviations as far as the wall thickness and the openings of the containers are concerned and with regard to inclusions in the material and injuries in the interior of the containers. Defective containers are automatically sorted out by mechanical means in the course of this examination.

The known examination devices have the disadvantage that defective containers are sorted out without taking into account their origin and, consequently, the mould causing the defect in question; due to the fact that these containers are recirculated as raw material into the production process, they cannot be subjected to an examination of origin later on. Due to the long throughput time through the annealing lehr and the subsequent examination rhythm of random samples, mould number-related defects will be recognized by manual reading of the impression produced by the mould number engraved on the mould, only one to two hours after said defects occurred, although, normally, such defects caused by defective moulds already occurred during the production of the containers.

An examination with regard to the individual moulds of the glass machine does, however, not take place; on the contrary, the defective mould must be ascertained separately. This

course of action is time-consuming so that substantial production losses must be accepted.

Hence, it is the object of the present invention to provide a method of monitoring the production quality of glass containers and an apparatus for making use of said method, said method and said apparatus permitting an unequivocal identification of possibly existing defective moulds and, consequently, rapid elimination of the defect in question. This method and this apparatus aim at achieving, as early as possible, continuous recording and automatic evaluation of the containers which have been identified as being defective and which have been ejected, with regard to the origin of said containers and, consequently, with regard to the mould causing the defect, so that a constant quality control with regard to the individual moulds of a glass machine is carried out for reducing production losses to a minimum in this way.

According to the present invention, the method of monitoring the production quality of glass container is characterized by the features that the respective containers, after having been separated from the other containers, are transported to a code reader arranged at the outlet of the annealinglehr and communicating with a process computer for storing the identity of each container in the sequence in which said containers are supplied to the code reader, that, subsequently or previously, container groups are formed with the aid of a stopping device which temporarily acts on the flow of containers and which is adapted to be controlled by the process computer or by mechanical means, said groups of containers consisting of a selectable number of containers, and that, after a break caused by said formation of groups, the containers are supplied in groups to one or to a plurality of inspection machines by means of which defective containers can be sorted out, the information provided by said inspection machines being evaluated in the process computer in the sequence of the identified containers of a group so as to find out an error trend.

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In the drawing an embodiment of the apparatus implemented according to the present invention and used for monitoring the production quality of glass containers is shown schematically and then explained in detail.

Containers 2 are produced by means of a glass machine 1, said containers 2 being supplied to an annealing lehr 6 via a conveyor belt 3 in the direction of an arrow 4. If desired, a counter 5 is arranged in the vicinity of the inlet of the annealing lehr 6 so that information can be obtained on the number of containers supplied to the annealing lehr.

In the direction of arrows 7, the stress-relieved containers are conveyed via a conveyor belt 8 towards a palletizing location 9. While being conveyed, the containers first pass a code reader 10 and then inspection units 11 and 12, which have to examine various properties of the containers 2, e.g. whether cracks exist in the glass, or dimensional deviations as far as the wall thickness and the openings of the containers are concerned, or whether inclusions exist in the glass. Defective containers are sorted out by the inspection units 11 and 12.

The code reader 10 is preceded by a stopper device 13 which is able to interrupt the transport of the containers 2 on the continuously moving conveyor belt 8 temporarily. The code reader 10, the device 13, the inspection units 11 and 12 and, if desired, additional inspection units as well as the counter 5 are connected via lines 14 to a process computer 15 whose memory contents can be monitored via a line 17 on a display 16 by the operating staff of the production plant.

Patent Claims:

1. A method of monitoring the production quality of glass containers which, coming from a glass machine, pass through an annealing Lehr and which are provided with a mechanically readable code related to the respective mould of the glass machine,

characterized in

that the respective containers (2), after having been separated from the other containers, are transported to a code reader (10) arranged at the outlet of an annealing Lehr (6) and communicating with a process computer (15) for storing the identity of each container in the sequence in which said containers are supplied to the code reader (10),

that, subsequently or previously, container groups (2') are formed with the aid of a stopping device (13) which acts temporarily on the flow of containers (2) and which is adapted to be controlled by the process computer (15) or by mechanical means, said groups of containers (2') consisting of a selectable number of containers (2),

and that, after a break caused by said formation of groups, the containers (2) are supplied in groups to one or to a plurality of inspection machines (11, 12) by means of which defective containers can be sorted out, the information provided by said inspection machines being evaluated in the process computer (15) in the sequence of the identified containers (2) of a group (2') so as to find out an error trend.